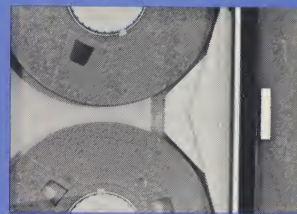


DR-3000 DIGITAL MAGNETIC TAPE SYSTEM



CEC

DATA RECORDERS DIVISION

CONSOLIDATED ELECTRODYNAMICS

A SUBSIDIARY OF
BELL & HOWELL

DR-3000 DIGITAL MAGNETIC TAPE SYSTEM

DESCRIPTION

Consolidated's DR-3000 Digital Magnetic Tape System is built around the first truly universal transport available, offering unequalled versatility and performance — at a lower price than any other comparable system. The instrument combines compactness and format flexibility with a wide selection of input/output logic levels. This provides a system ideally suited to a variety of commercial or laboratory data processing applications.

Complete IBM compatibility in either 7-channel 729 series or 9-channel 360 series systems is a feature of the DR-3000. Compatibility is assured with any other DR-3000 or any other IBM compatible tape system operating within IBM specifications. The DR-3000 is available in horizontal or vertical cabinets; compact transport design permits the mounting of 2 or 3 to a rack. (It will also fit through a submarine hatch.) Rugged construction permits use of the transport in semi-mobile or extreme environments.

The DR-3000 is available with a selection of standard tape speeds, choice depending upon tape handling requirements. Transport models are generally alike, with interchangeable components.

TRANSPORT

Basic philosophy in designing the DR-3000 transport was to create a low cost unit that was still highly reliable during long periods of operation. Gentle tape handling is an important design feature, with the tape totally supported on air bearings which eliminate friction and tape wear. The transport provides packing densities of 200, 556, 800 bpi, and high density phase encoded 1600 bpi format is available on special order.

The DR-3000 is the only low cost transport on the market with absolute straight-line loading. This system features the optimum in loading ease: the tape is dropped into a slot and the end is spun onto the takeup reel, the whole

operation taking no more than 10 seconds. All elements of the transport are built on a 1¼ inch cast baseplate, which assures top performance and high reliability under all conditions of operation. It is assembled from modular subassemblies, permitting rapid repair and maintenance through the exchange of subassemblies.



Door open to show interior control panel and tape handling components.

FEATURES

- Fully IBM compatible with assured machine-to-machine compatibility.
- Straight line loading path provides rapid, easy tape loading.
- Horizontal or vertical cabinet mounting.
- Selectable input/output logic levels provide wide flexibility of interfacing.
- Dual capstans with positive drive preclude tape slippage or "creep" and eliminate belts.
- Air bearings eliminate all tape contact and wear in storage area.
- Compact rugged design mountable in 19" of a standard 24½" cabinet.
- CEC-built, all-metal-surface heads provide extra long head life.



The transport command electronics are all solid-state. Interlocked circuits prevent ambiguous functions resulting from simultaneous or contradictory commands. Its unique, compact design eliminates large vacuum columns and thus provides a total transport which can be mounted in 19 inches of vertical rack space.

DRIVE SYSTEM

The DR-3000 provides bi-directional operation using ½ inch mylar tape with 10½ inch IBM-type reels. CEC's patented self-locking friction hub uses self-energizing wedging to assure positive reel locking and easy loading. There are no programming restrictions at a cycling rate of up to 200 commands per second, at any random command sequencing. Programmed delays are not required to protect the transport or tape within the specified cycling rates. The tape is driven by means of dual counter-rotating capstans for forward and reverse directions. Each capstan is driven by its own hysteresis synchronous motor, thereby eliminating belts, gears, or any other mechanical linkages. A fly-wheel is provided each motor to insure smooth operation under all cycling conditions. Pinchroller drive actuators are used because they are the most positive and reliable method of driving tape. Each pinchroller is mounted on a pivotal yoke which is self aligning for minimum skew. A third pneumatically operated brake actuator insures positive stopping action with no possibility of creep. Low friction, rolling brush variacs driven by the tape storage buffers are used in conjunction with a-c reel motors to achieve a servo system which totally eliminates servo electronics and consumes minimum power. Each reel is controlled independently by its own servo. This system provides a proportional servo system which moves the reels smoothly in response to any tape motion at the head. The extreme simplicity of the system promotes reliability and protects the tape under all cycling conditions.

EASY OPERATION

The DR-3000 transport, in both horizontal and vertical mounts, is hinged and swings out for complete front accessibility. Only this front access is required for normal operation and maintenance. A control panel for manual operation at the transport is included. Backlighted push-buttons illuminate when activated. The local controls are Power, Manual/Remote, Forward, Reverse, Rewind and Stop.

Indicator lights include Ready (all interlocks closed), and Load (transport ready to accept tape). The machine automatically switches to load condition when the tape is run off the takeup reel. Command electronics of the transport have the built-in capability for both manual and remote operation. Remote signals enter on a connector mounted on the rear of the transport; remote commands are Forward, Reverse, Rewind and Stop.

MAGNETIC HEADS

Magnetic heads on the DR-3000 system are CEC manufactured, all-metal-front-surface heads, which have demonstrated long operational life. Seven channel IBM 729 series or 9 channel 360 series compatible dual read/write heads are available. The head is mounted on a precision base-plate that includes guides, magnetic shield and connector. This assembly permits installation or replacement of the head without adjustment on the transport. The redundant head stacks are magnetically isolated with separate shields to preclude write-to-read head, error-producing crosstalk. Signal cables are grounded at the electronics rack to eliminate ground loops. DR-3000 magnetic head and tape guides have been designed to eliminate tape flap under all cycling conditions. The system has undergone extensive testing to insure that complete head-to-tape contact is maintained at the face of the head during and between all operating modes.

READ/WRITE ELECTRONICS

All data circuits of the DR-3000 are fully transistorized and modular plug-in construction is used throughout. Circuits are mounted on interchangeable glass-epoxy printed circuit cards. Test points are brought out at the leading edge for signal monitoring and trouble shooting.

System electronics are compatible with IBM 727 and 729 and 360 series systems (using standard NRZ-1 recording). Skew correction and peak detection read circuitry is employed for maximum reliability. Read electronics are self-locking. 1600 bpi high density phase encoded read/write electronics are available on special order. A separate power supply is provided for the read/write electronics and may be easily removed from the rack by disconnecting head and signal cable connectors in the case. A card extender is included with the system.

ACCESSORIES

File Protect switch kit is optionally available. A pneumatically operated actuator sensor detects the presence or absence of the write enable ring. The sensor linkage pulls away when the ring is in place; thus, the sensor never touches the reel or ring when the reel is in motion.

EOT/BOT — IBM compatible photoelectric end of tape and beginning of tape sensor is optionally available. Two identical sensors and circuits make up the assembly, one for load point and one for EOT signals.

Numerical indicator is optionally available. A large number on the transport control panel will be illuminated to show that the transport will accept commands if the proper select lines have been activated.

Running time meter is optionally available. It records operating time in hours and tenths, and is mounted behind the control panel cover.

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GENERAL SPECIFICATIONS

DR-3000 DIGITAL MAGNETIC TAPE SYSTEM

Full IBM compatibility is guaranteed at all tape speeds and at all densities up to and including 800 Bpi.

TAPE TRANSPORT

TAPE SPEED: 37 1/2, 75 ips, 112 1/2 standard; other speeds on special order.

TAPE WIDTH & THICKNESS: 1/2" width, 1.0 or 1.5 mil thickness mylar.
(all performance specifications are met in test procedures using 3M 598, 3M 599, Memorex 22D, IBM 229269, or CEC SX1 computer tape)

TAPE REELS: IBM type 10 1/2" reels. Self centering, self locking, 1/4 turn hubs are standard.

TAPE LOADING: Straight path, no threading. Loads in 10 seconds or less.

RECORDING FORMATS: 7 or 9 track, NRZ-1 IBM compatible standard.

RECORDING DENSITY: 200, 556 or 800 Bpi standard. 1600 Bpi phase encoded available on special order.

INSTANTANEOUS SPEED VARIATIONS (FLUTTER): $\pm 0.5\%$ at 112 1/2 ips.

STEADY STATE SPEED VARIATIONS: $\pm 0.3\%$ of absolute. Either forward or reverse at 37 1/2, 75, or 112 1/2 ips with constant line frequency of 60 Hz.

START TIME: Less than 4 msec. bi-directional.

START DISTANCE: At 112 1/2 ips, 0.130" ± 0.05 ".

STOP TIME: Less than 3 msec. bi-directional.

STOP DISTANCE: At 112 1/2 ips, 0.148" ± 0.022 ".

TURNAROUND TIME: 6 msec. maximum to within 10% of final speed.

COMMAND REPETITION RATE: Cycling rate to 200 commands per second without program restrictions.

REWIND TIME: 2400 feet in 144 sec. under servo control.

INTERCHANNEL TIME DISPLACEMENT: Maximum total skew is within requirements for assured IBM 729 or 2400 series machine to machine compatibility. Total maximum skew at 112 1/2 ips, 4.0 usec.

MINIMUM CHARACTER SPACING: At 112 1/2 ips, 800 Bpi, 7.5 usec.

BIT DROPOUT: Less than 1 in 10⁷.

CONTROLS, LOCAL: Stop, Forward, Reverse, Rewind, Power, Manual/remote.

CONTROLS, REMOTE: Forward, Reverse, Rewind. Stop line not required except when numerical indicator is used. D.C. signal level 4 to 10 volts will affect command, "NO" command (or stop level) is 0V ± 1 V. Maximum rise time is 10 usec. Command input impedance is 4K min.

INDICATOR LIGHTS: Ready (when all interlocks are closed), File Protect (indicates when protect ring is installed on reel). Transport automatically goes into load position when there is no tape on the machine.

HEADS: CEC all-metal-front-surface heads. Head azimuth adjustment for minimum mechanical skew is provided. 7 channel IBM 729 series or 9 channel 2400 series compatible dual read/write heads are standard.

ELECTRONICS

CEC all-transistorized modular read/write electronics is available along with a self-contained and separate power unit. Test points are brought out on the leading edge of the cards for operational monitoring and servicing. Card holder size: 7"H x 19"W x 8 1/4"D.

READ CIRCUITRY: Peak detection read circuitry with individual amplifier static skew adjustments for both forward and reverse operation is employed for maximum system reliability. Electronics operate at 200, 556, or 800 Bpi. Standard outputs are in the form of ± 10 V minimum pulses capable of driving a 150 ohm load with the following characteristic: Rise time; 0.10 microsecond; a pulse represents a binary one. Other output pulses or levels may be obtained on special order. Longitudinal and lateral parity check circuitry is optionally available.

WRITE CIRCUITRY: Write circuitry employs NRZ-1 (flux change on binary "ones") methods for saturation recording. Input pulses or levels; 0 ± 1 V = false, ± 4 to 10V = true. Individual deskewing adjustments are provided on each write amplifier for both forward and reverse operation. Longitudinal parity generation is available at no cost but requires external reset pulse.

ACCESSORIES: Standard options include IBM compatible photo-electric end of tape sensing, file protect kit, numerical indicator, running time meter.

PHYSICAL DATA

TRANSPORT: Height, 19"; width, 24 1/2"; depth, 14 3/4" (12" behind transport baseplate); weight, 135 lbs.; 215 lbs. with dust cover, trim and compressor.

CABINETS: Two cabinet styles; vertical and horizontal are available for mounting the DR-3000 and associated electronics.

	Horizontal (Max.)	Vertical (Max.)
Height	66 1/4"	73 1/4"
Width	28 3/4"	24"
Depth	25 1/2"	25 1/2"
Total Weight (System)	600 lbs. max.	625 lbs. max.

ACCESSIBILITY: Front access only is required for normal maintenance and operation. Transport is hinged and swings out for complete accessibility in both horizontal and vertical mounts.

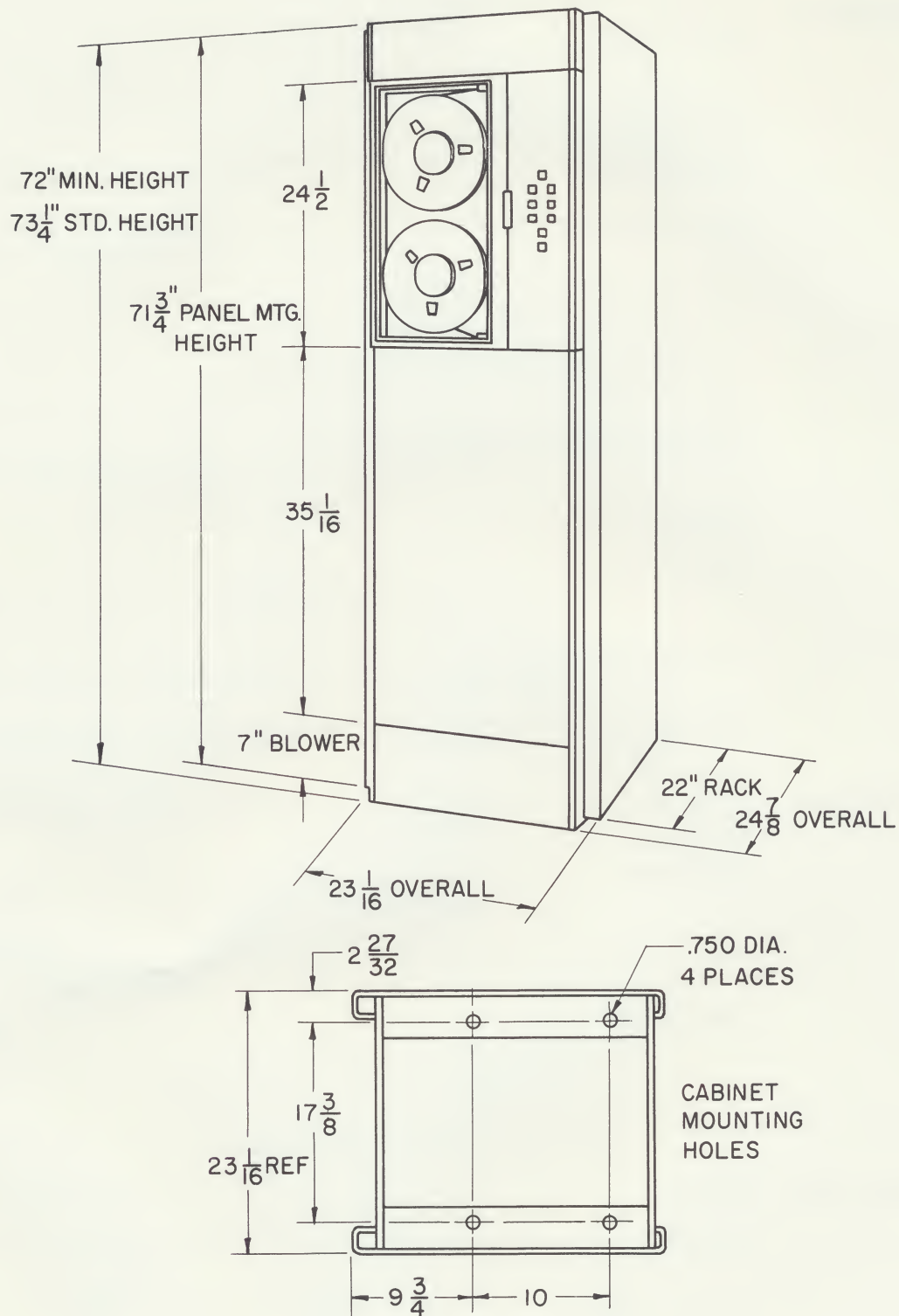
TRANSPORT POWER: 1KVA (without compressor)

SYSTEM POWER: Input 105-125 V RMS, single phase, 20 amps at 125V line maximum. International voltages and frequencies are optionally available.

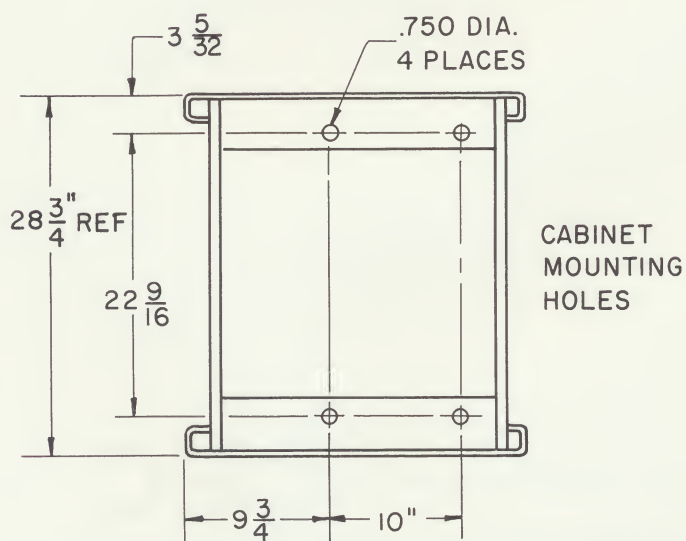
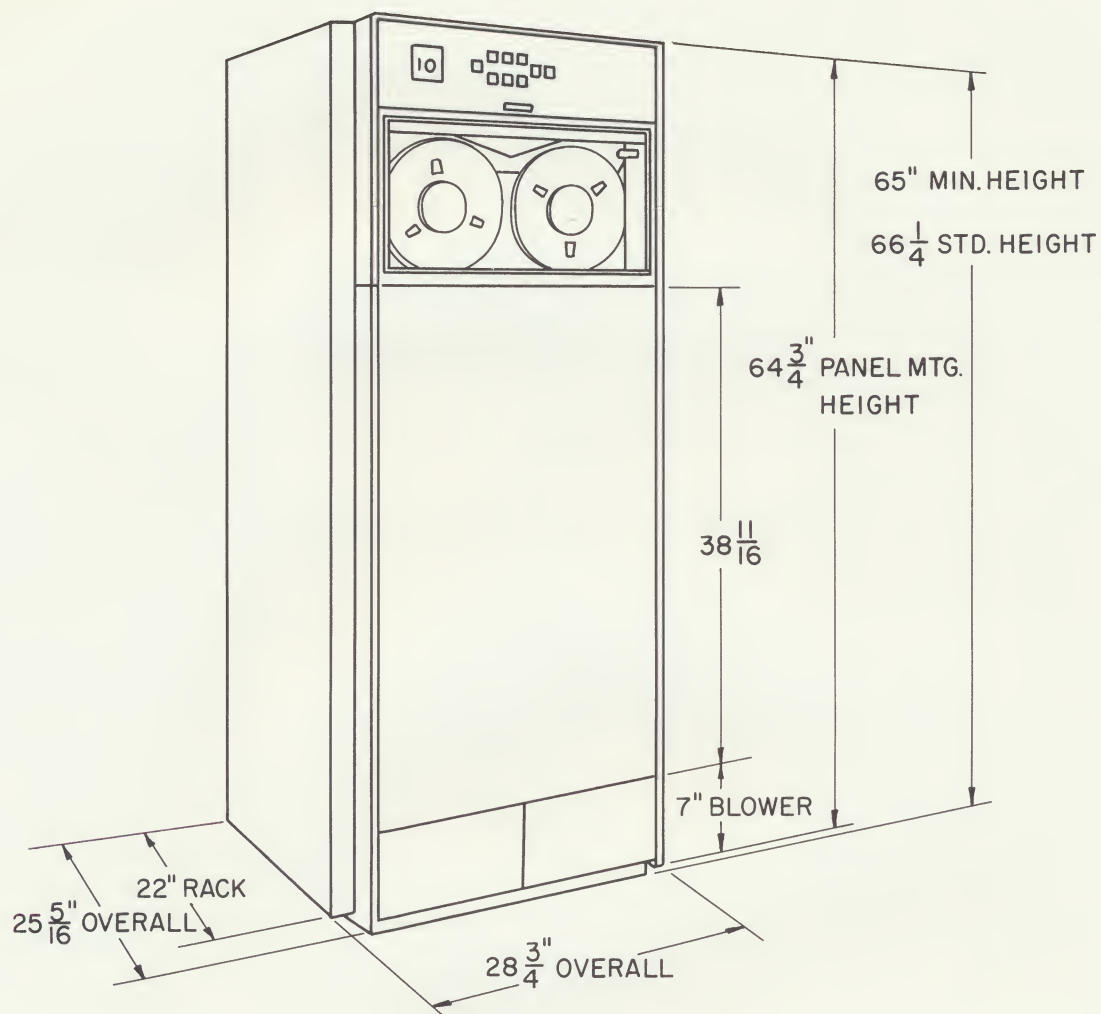
ENVIRONMENT: System is intended for laboratory, fixed-plant, shipboard or semi-mobile portable use and will perform in all conditions normally common to these environments.

NOTE: All specifications based on standard CEC test procedure.

Bulletin 3000S-76



SYSTEM OUTLINE, DR 3000
WITH VERTICALLY MOUNTED TRANSPORT



SYSTEM OUTLINE, DR 3000
WITH HORIZONTALLY MOUNTED TRANSPORT

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